

Production Performance of Indian Groundnut: An Analysis of Growth and Instability

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ABSTRACT: Groundnut is one of the major edible oilseeds in the world. It contributes a significant portion to the world's oilseed economy. India is the second largest producer of groundnuts in the world. Indian groundnut has the ability to bridge the gap between domestic demand and supply of edible oil if it is brought under more acreage.

This paper examines the growth and instability in area, production and productivity of groundnut in India for the period 1988-89 to 2017-18. Growth rate analysis was used to study the annual growth in area, production and yield of groundnut. Instability in groundnut production was measured using Coefficient of variation and Coppock's instability index. This study was taken up to provide implications for reducing the gap between demand and supply of groundnut which is one of the major edible oilseeds in the world. Results showed that the growth rate of groundnut area in India was found to be negative and significant during overall period of the study. The growth rate of production was non-significant and the growth rate of productivity was positive and significant during over all period.

Keywords: Coefficient of Variation, India Groundnut, Analysis of Growth, Instability, Production, Productivity.

INTRODUCTION

Agriculture plays a vital role in Indian economy. More than half of the Indian population is scattered in rural areas and is having agriculture as the main occupation. Indian agriculture sector contributes over 18.00 per cent of India's gross domestic product (GDP) and provides employment to 50.00 per cent of the countries workforce. Two third of labour force is directly or indirectly dependent on agriculture for livelihood.

Agriculture remains as an important feature of the economic landscape in India (Amarender Reddy, 2013). Agriculture sector provides raw materials for many industries like textiles, edible oils, tobacco, sugar etc. Diversified crops like cereals, pulses, oilseeds, spices and condiments are grown all over the country.

India is one of the major growers of edible oilseeds. Oilseeds contribute the second most to the Indian agricultural economy after food grains in terms of area and production (Tripathy and Srinivasa Gowda 1993). India is the fourth largest in edible oil economy in the world. India's diverse agro-climatic conditions are favourable for growing various oilseeds. Major edible oil seeds that are being grown in India are groundnut, soybean, safflower, sesame, sunflower, rapeseed-mustard and niger, whereas castor and linseed are being grown as non-edible oilseed crops. Even after standing highest in terms of oilseeds area, the indigenous

production could not meet requirements (Singh and Dhaliwal 1993). India is still importing oil requirements from other countries due to gap between domestic demand and production. The edible oilseed imports are expected to expand in future (Pandey *et al.*, 2005). Addisu (2000) reported that irrigation, market prices, rainfall and labour charges have a significant impact on area and yield of oil seeds

Groundnut (*Arachis hypogaea*) is one of the most important oilseeds in the world. It can be called as peanut, monkey nut, earth nut and goober etc. Groundnut has numerous benefits including nutritional and industrial uses as well. Groundnut seeds are edible and oil is extracted and kernel is a rich source of protein. It is a cash crop that provides farmers with income and livelihood. Groundnut was the largest grown oilseed before implementation of AoA (Meena *et al.*, 2015).

India holds an eminent position in the world's industry of oilseeds with the share of almost 10.00 per cent in production. The major countries that contribute the most to the overall production are India and China followed by USA, West Africa, Sudan and Nigeria. India is at the first place in terms of groundnut area and second in production. But the average productivity is comparatively less than the other countries such as USA, China and Brazil whose yield levels of are almost three times higher than the world average yield

(Sangeetha *et al.*, 2017). The reasons for low productivity include poor local markets, poor structure in pricing (Ngwira *et al.*, 2012). Groundnut contributes the major portion of oilseeds production having occupied more than half of the oilseeds area in the country. In the country the cultivation of groundnut is limited to some major states including Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra, Rajasthan, Madhya Pradesh, Orissa and Uttar Pradesh. Gujarat holds the top position in terms of groundnut area and production in the country (Lokapur *et al.*, 2014), whereas Tamil Nadu stands in the first in terms of productivity.

MATERIALS AND METHODS

The data required for the study was collected from purely secondary sources. Various sources of secondary data including government publications, reports and official websites have been used in collection of data regarding area, production and productivity of groundnut. The data regarding area, production and productivity of groundnut in India was collected from 1988-89 to 2017-18, which includes the data of 30 years. The study period has been divided into two sub periods: Period I (1988-89 to 2002-03), Period II (2003-04 to 2017-18) and overall period. Tabular analysis, compound annual growth rate and instability indices were used in the study to arrive at meaningful conclusions.

A. Growth Rate Analysis

The growth rates are used to measure the past performance of the economic variables. The growth in area, production and productivity were analysed by using exponential growth function.

$$Y = ab^t$$

Where,

Y = Area /Production / Productivity t= Time variable

b = Regression coefficient a = Intercept

The compound growth rate 'r' was computed by using the following formula.

$$CGR (r) = [\text{Antilog} (\log b) - 1] \times 100$$

B. Instability Analysis

Instability is expected to hamper the process of economic development. The degree of instability in

area, production and productivity of groundnut were measured by using Coefficient of Variation (CV) and Coppock's Instability Index (CII).

(a) Coefficient of Variation (CV). The coefficient of variation measures the variation around the trend and it is expressed in percentage.

$$\text{Coefficient of Variation (CV)} = \frac{\sigma}{\bar{X}} \times 100$$

Where,

= Standard deviation

$$s = \sqrt{\frac{\sum(X - \bar{X})^2}{n}}$$

Where,

\bar{X} = Arithmetic mean X= Variable

n = Number of observations

(b) Coppock's Instability Index (CII). Coefficient of instability is another measure of instability besides coefficient of variation. The coefficient of variation measures the absolute variation. Coppock's Instability Index (CII) is close approximation of the average year to year percentage adjusted for the trend and pronounced than the absolute variation.

Coefficient of instability was worked out using Coppock's Instability Index (CII).

$$\text{The Instability Index} = [\text{Anti log} (\sqrt{V \log}) - 1 \times 100]$$

$$V \log = \frac{\sum \left(\log \frac{X_{t+1}}{X_t} - m \right)}{N}$$

Where,

X_t = Area/ Production/ Productivity of groundnut export in year t N = Number of years

m = Arithmetic mean of the difference between the log of X_t and $X_{(t-1)}$, $X_{(t-2)}$ etc. V log =Logarithmic variance of the series

RESULTS AND DISCUSSION

The collected data was analyzed and results are presented in this section along with meaningful conclusions.

Table 1: Contribution of major states to area and production of Indian groundnut, 2016-17.

State	Acreage (000 ha)	Production (000 MT)
Andhra Pradesh	1013.00	603.00
Gujarat	1759.00	3157.32
Tamil Nadu	282.49	588.85
Karnataka	666.00	419.00
Rajasthan	556.09	1140.61
Others	1061.46	1552.75
Total	5338.04	7461.53

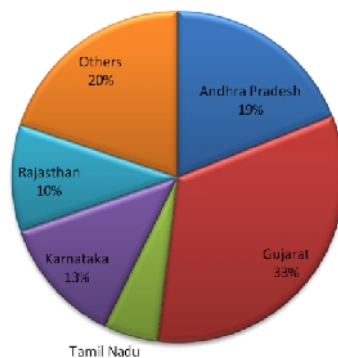


Fig. 1. Per cent share of major states in area of groundnut in India, 2016-17.

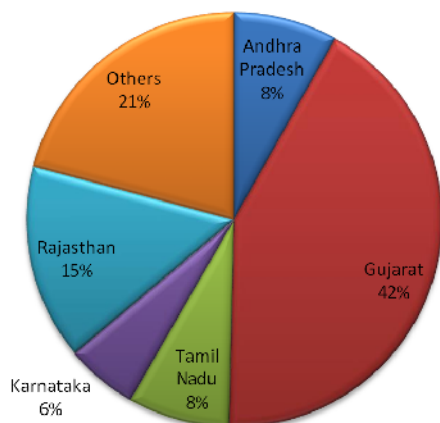


Fig. 2. Per cent share of major states in production of groundnut in India, 2016-17.

It was observed from Figure 1 and Figure 2 that during 2016-17 Gujarat ranked first among the Indian states both in area and production with a share of 32.95 per cent and 42.31 per cent, respectively that was 1.7 mha area and 3.1mT production (Table 1). Though Andhra Pradesh was in second place in case of area with a share of 18.98 per cent its share in production was only 8.80 per cent and this was due to low productivity of groundnut in that state. The same was observed in the case of Karnataka where its share in area was 12.47 per cent but the share in total production was only 5.61 per cent. Rajasthan, with a share of 15.28 per cent in total production stood in second place after Gujarat even with a low share of 10.41 per cent of total area. This was mainly because of high productivity of groundnut in Rajasthan. Tamil Nadu shared 5.30 per cent of area and 7.89 per cent of total production.

Analysis of Growth Rates. The results revealed that in overall period, area of groundnut had shown a negative growth rate of 2.11 and found to be statistically significant at one per cent level of significance* (*shows that the area of groundnut

was decreasing during overall study period). The growth rate of production was found to be non-significant. Whereas the productivity of groundnut had shown a positive growth rate of 1.77 per cent per annum and was statistically significant at one per cent level of significance indicating the increased productivity. This reveals that even when area and production of groundnut have been decreasing, productivity was found to be increasing and this may be due to the usage of high yielding varieties and intensive cropping of groundnut. Fig. 3 shows how area, production and productivity had grown during 1988-89 to 2017-18.

During period I, area had shown a negative growth rate of 2.58 per cent per annum and in period II, it had shown a negative growth rate of 2.21 per cent per annum and found to be statistically significant at one per cent level of significance in both the periods. Growth rate of production in period I was negative with 3.11 per cent per annum and found to be statistically significant at one per cent level of significance. In period II the growth rate of production was found to be non-significant. In period I, productivity had shown a negative growth rate of 0.55. The growth rate of productivity was found to be 2.93 per cent per annum and statistically significant at five per cent level of significance during period II. The results obtained are in close agreement with the findings of Kannan and Sundaram (2011), which concluded that there was a negative growth in area and production of groundnut. Audichy Ranjana *et al.* (2017) also showed that growth in groundnut area was negative.

Instability Analysis. In order to study the extent of fluctuations in area, production and productivity during the study period, co-efficient of variation and coppock's instability index were worked out.

Table 2: Compound Growth Rates of area, production and productivity (per cent per annum).

Sr. No.	Particulars	Area	Production	Productivity
1.	Period I	-2.58*	-3.11*	-0.55
2.	Period II	-2.21*	0.65	2.93**
3.	Overall Period	-2.11*	-0.38	1.77*

*, ** significant at 1 per cent, at 5 per cent level of significance

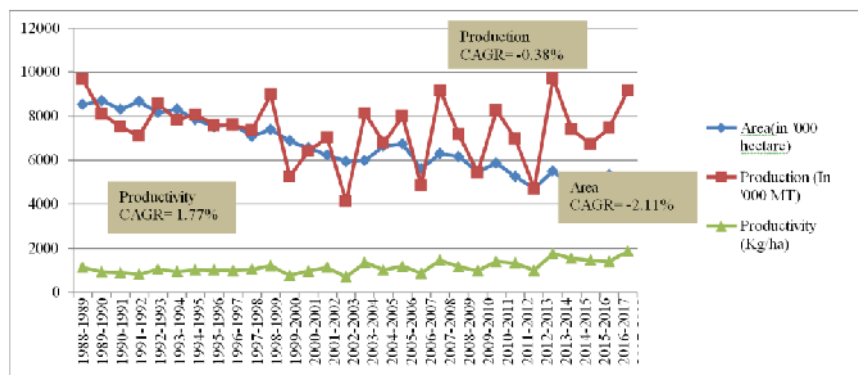


Fig. 3. Growth in area, production and productivity of groundnut (1988-89 to 2017-18).

Table 3: Co-efficient of Variation of area, production and productivity.

Period	Particulars	Area	Production	Productivity
Period I	MEAN	7583.80	7410.33	0.98
	SD	894.13	1381.96	0.14
	CV (%)	11.79	18.65	14.37
Period II	MEAN	5590.73	7330.13	1.32
	SD	684.10	1511.35	0.29
	CV (%)	12.24	20.62	21.85
Overall Period	MEAN	6587.27	7370.23	1.15
	SD	1280.31	1423.50	0.28
	CV (%)	19.44	19.31	24.75

It could be seen from Table 3 that, the area under groundnut production exhibited less variability with co-efficient of variation at 11.79 per cent and 12.24 per cent in period I and period II and in overall period co-efficient of variation was 19.44 per cent. The production of groundnut exhibited higher variability as that of area with co-efficient of variation at 18.65 % and 20.62 % in period I and period II and with co-efficient of variation of 19.31 per cent in overall period. And in case of productivity co-efficient of variation was 24.75 per cent showing higher variability in overall period. The co-efficient of variation was 14.37 and 21.85 per cent in period I and period II respectively showing higher variability in period II as that of period I.

It is revealed from the Table 4 that the variation observed in area, production and productivity was 12.17, 12.37 and 12.69 per cent respectively during overall period. In period I higher variation took place in case of production with 12.36 per cent as compared to area with 11.30 per cent and productivity with 11.63 per cent. In period II, the higher variation was observed in productivity with 12.49 per cent as that of 11.30 per cent in area and 12.47 per cent in production.

The discussion thus revealed that instability in groundnut production and productivity was increasing. Findings can be correlated with Chand *et al.* (2011).

Table 4: Coppock's Instability Index of area, production and productivity (per cent).

Sr. No.	Particulars	Area	Production	Productivity
1	Period I	11.30	12.36	11.63
2	Period II	11.30	12.47	12.49
3	Overall Period	12.17	12.37	12.69

CONCLUSION

There is an immense scope to expand India's potential of groundnut production. Groundnut acreage at country level had shown decreasing trend. There is a necessity to restrict further reduction by opting appropriate support policy measures like public private partnership through linkages with oil extraction industries so as to encourage farmers to grow groundnut, implementation of price support policies and contract farming. High priority should be given to increase the production and export of groundnut. This is necessary to meet the

increasing domestic demand on one hand and to build up a sustainable supply to meet international markets for earning foreign exchange through groundnut export on the other hand.

FUTURE SCOPE

Periodical studies on production performance and productivity of any crop help in determining the country's self-sufficiency pertaining to a commodity. Growth in the area under groundnut and instability in growth can help in planning awareness programmes to increase the acreage under particular crop.

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